

Scientia Canadensis

Canadian Journal of the History of Science, Technology and Medicine
Revue canadienne d'histoire des sciences, des techniques et de la médecine



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Volume 16, numéro 1 (42), 1992

URI : <https://id.erudit.org/iderudit/800343ar>

DOI : <https://doi.org/10.7202/800343ar>

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Éditeur(s)

CSTHA/AHSTC

ISSN

0829-2507 (imprimé)

1918-7750 (numérique)

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Citer cet article

Whitney Langford, M. & Debresson, C. (1992). The Role of Hydro Quebec in the Rise of Consulting Engineering in Montreal 1944-1992: An essay in oral history and company genealogy. *Scientia Canadensis*, 16(1), 76–108.
<https://doi.org/10.7202/800343ar>

The Role of Hydro Quebec in the Rise of Consulting Engineering in Montreal 1944-1992: *an essay in oral history and company genealogy*



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INTRODUCTION

AT LEAST 3 strands of research form the background of this paper: the study of the emergence of francophone engineering in Quebec, at the Ecole Polytechnique (Gagnon, 1991); the history of all engineers operating in Quebec, at the Université de Montréal (Guédon & Langford, 1993); and the authors' immediate involvements with ongoing research in energy and public enterprise at CREDIT (Centre for Research in Industrial and Technological Development), at the Université du Québec à Montréal (e.g., Niosi et al., 1988; Faucher & Bergeron, 1986). The particular aims of this project have been to obtain the perspective of key actors in the enormous changes in Montreal-based consulting engineering, from the founding of Hydro-Québec in 1944 to the still turbulent present, and to elucidate the complex relationships among some of the principal firms, and between these firms and Hydro-Québec. For this purpose, ten engineers were interviewed at length, principally in 1989 and 1990, with up-dates necessitated by events in 1991 and 1992. This research was made possible by the existence of the Shell Canada Montreal Oral History Project at Concordia University Libraries' Non-print Division, administered by Loren Lerner.

All would agree that the public enterprise founded in 1944 by the government assumption of control over the Montreal Light Heat & Power Company and enlarged in 1962-1963 by the purchase of the Shawinigan and other water and power companies had a transforma-

tional effect on the nature and direction of engineering and indeed all technical occupations in Quebec and particularly in its metropolis. Among the strongest themes that emerged from the engineers' discussion of the recent evolution of Montreal consulting engineering are the following:

- 1 The rise to comparative dominance of francophone (and multilingual) firms since the late 1950's and early 1960's;
- 2 The high relative importance of hydroelectric power engineering, with special reference to the political, economic, social, and ecological issues raised by phase I of the James Bay project of the 1970's;
- 3 Growth (or survival) by means of the employee-owned firm;
- 4 Evolution from design and specification service to total service and project management, and to increased flexibility in recombination of firms;
- 5 Formation of strategic alliances (joint ventures, acquisition of subsidiaries, consortia, and mergers).

The first two themes concern the specific environment of Quebec, with emphasis on Montreal as its metropolis; the remaining three reflect global changes in the nature of consulting engineering firms and projects, and while the details are fascinating, Montreal's experience is hardly unique.

In this article, therefore, we will concentrate on the first two themes: the rise of francophone engineering, with the concomitant decline in relative importance of the anglophone firms; and the nature and great importance for Quebec of hydroelectric engineering projects, highlighted by the symbolic, almost mythical, as well as economic, significance of such projects as the Manicouagan-Outardes in the 1950's, on the north shore of the St. Lawrence, and the first phase of the James Bay project in the 1970's. In these two areas, the Montreal case is unique. In the first area, the cosmopolitan, previously anglo-Canadian and American-dominated metropolis was faced with representing not only its own largely francophone, bilingual, and multilingual population, but a massively francophone québécois hinterland, and an uneasy relationship with Canadian confederation. All of these particularities have affected, and have been affected by, the operations of these firms.

In the second area, Quebec's geographical characteristics make hydroelectric energy development a more dominant economic thrust than in most of Canada's regions. A multiplicity of waterfalls, characteristic of the Canadian Shield, almost cover its landscape. They drain west to Hudson's/James Bay, east to the Gulf of St. Lawrence and the Atlantic, north from the Appalachian highlands (like the St. Francis

and the Richelieu) and south from the shield (like the St. Maurice) to feed a huge artery of commerce – the St. Lawrence River – bisecting the most heavily populated area of Quebec and linking the entire Great Lakes water system of central North America with the ocean.

In this situation, water power was developed as early here as in other parts of the world such as Switzerland, Norway, France, and, in North America, Ontario and New York state (Niagara Falls). An increasingly highly-developed long-distance transmission capability, coupled with the lure of an energy-hungry, urbanizing, northeastern Canada and United States market, have led generations of Quebec politicians to make electricity central in their economic prescriptions for local development, prosperity for the people – and in their quest for power (for industry, for cities, for homes, and for themselves and their parties).

METHODOLOGY

The choice of firms was based on length of existence and current importance in the field of hydroelectric engineering. The oldest, Montreal Engineering Company (Monenco), founded in 1907 to service the Killam/Royal Securities Corporation utility companies, was always an internationally-oriented operation; its difficulties following Killam's death in the 1950's and the francisation movement in the 1960's eventually led to the removal of its head office to Calgary. But the other three firms chosen have remained Montreal-centred as they expanded worldwide, and are now all part of the same firm: SNC (founded in 1911 by Arthur Surveyer, who was joined by another French Canadian and a German-Swiss, the firm being known until the 1960's as Surveyer, Nenniger & Chenevert); Shawinigan Engineering, founded in 1919 to serve principally the needs of Shawinigan Water & Power Company; and Lavalin, founded in 1937 as Lalonde & Valois, as a chiefly civil engineering firm.

The choice of key events to focus on was based on a perception of those events in the firms' recent histories which were most symptomatic of the social, economic, and political transformations going on in the nature of consulting engineering in Montreal, Quebec, Canada, and the world. They were:

- 1 1962: the beginning of Shawinigan Engineering's existence as an independent, employee-owned firm as a result of Hydro-Québec's acquisition of Shawinigan Water & Power;

- 2 1972: the choice of Lavalin as the principal private Canadian participant in the management of the James Bay project;
- 3 1982: the acquisition of a financially troubled Shawinigan Engineering by Lavalin, which valued its extensive hydroelectric engineering expertise;
- 4 1992: the process of merger among SNC, Lavalin, and its by-now subsidiary Shawinigan-Lavalin, a fusion which was precipitated by the financial collapse of Lavalin during the recession of the early 1990's (August 1991).

The choice of people took two directions: either working engineers whose careers exemplified the evolution of the firms, or engineer/administrators who had been in responsible positions during key moments in the history of the relationship between Hydro Quebec and the firms.

The first category includes George Scruton, still a globe-trotting engineer although officially retired from Shawinigan-Lavalin/SNC Lavalin; George Denovan, a recent retiree of Shawinigan Engineering who had the advantage of being the son-in-law of the firm's president in its heyday (R.A. Hertz, who began with the firm at its creation in 1919 and died in 1988); and Jo-Ann Paquet, a recent graduate of Laval in metallurgical engineering, veteran of Alcan and Qualisys, who is now in charge of "total quality management" in the merger process by which Shawinigan-Lavalin and SNC's divisions of energy and megaprojects (*grands travaux*, or great works, in French) are being fused into a new division of SNC-Lavalin, which is called SNC-Shawinigan.

The second category includes some of the best-known names in the recent history of Quebec engineering. First of all, Robert A. Boyd, a francophone graduate of Ecole Polytechnique and employee of Hydro-Québec at its founding in 1944, managed the merging of personnel when Shawinigan Water & Power and other companies were brought under one roof in 1963, and was president of the Société d'énergie de la Baie James (SEBJ) and thus *primus inter pares* of the committee managing James Bay I, and president of Hydro Quebec from 1977 to 1981.

From the senior firm of the three-in-one Montreal giant of today, we interviewed Camille Dagenais, who led the transformation of SNC into a world-class worldwide engineering firm; and his successor as president, Jean-Paul Gourdeau. (Time prevented interviewing the current [1992] president of SNC-Lavalin, Guy Saint-Pierre, who would

also have a wide perspective, having served as an engineer, as a Liberal cabinet minister in the early 1970's, and as president of Ogilvie Flour Mills before taking his present position.)

As for the two premier anglophone firms in the hydroelectric field, Shawinigan Engineering was represented by two senior engineers, (Scruton and Denovan, mentioned above); and in the case of Monenco, by J.K.C. Mulherin, its last Montreal-based president.

The most recent, and in many ways the most successful firm in pan-Canadian terms, has been Lavalin. Three prime movers were identified: Bernard Lamarre, son-in-law of a founder, who guided the firm's expansion through the post-Duplessis exuberance of the Quebec economy in the 1960's, and the diversification of the 1970's, and is currently consultant to the president of SNC-Lavalin; Marcel Dufour, longtime president of the subsidiary firm National Boring and Sounding/Compagnie de Forage et Sondage, and until recently president of Lavalin International; and Armand Couture, who participated in innovative projects of the 1960's (e.g., the Louis-Hippolyte Lafontaine Tunnel in Montreal), represented Lavalin on the committee of management for James Bay and the negotiations with the Cree culminating in the James Bay Agreement of 1975, managed and presided over the merger of Shawinigan Engineering with Lavalin in 1982, and became, as of September 1, 1992, president and chief operating officer of Hydro-Québec.

THEME I: THE COMPARATIVE RISE OF FRANCOPHONE FIRMS

The purchase of the Shawinigan Water and Power by Hydro Quebec in December 1962 is often seen as a symbol of the Quiet Revolution, but it was part of a much longer and less mythologized historical process (Paquet, 1988). This company, founded in 1898 by Montreal, New York and Boston interests, transformed the city of Shawinigan (then called Shawinigan Falls) from a forest village to an industrial centre. The three industries lured there to take advantage of cheap abundant power were Belgo-Canadian Pulp & Paper (later Consolidated Bathurst); Northern Reduction Company (later Alcan), and Shawinigan Carbide, later Shawinigan Chemicals, acquired by Gulf Oil (U.S.) as a consequence of the events of 1962. Originally a dynamic and innovative force for provincial development, the Shawinigan Water & Power firm gradually became smug in its own leadership position in Quebec hydroelectricity, and the object of resentment of those fighting the "electricity trust" in the 1930's (Langford, 1988). Hydro-Quebec was founded in 1944, taking over the

even more arrogant Montreal Light Heat and Power Company; by 1962 Shawinigan was the largest private electric power utility (16.5%), exceeded only by Hydro Quebec (35%) and by Alcan (27.5%), which used most of the power it produced, as well as serving as the general utility in the Saguenay area, where its largest operations relocated in the 1920's.

The mythical nature of perceptions of the takeovers of 1962-63 is connected with the dramatic circumstances under which the Lesage government of Quebec, with René Lévesque as Minister of Natural Resources, called an election on this issue only two years after its original mandate in 1960, and won. The passions aroused, and their origins, are demonstrated by two incidents of early 1962. René Lévesque recalled in his memoirs the question of a whisky-laden redhead in a Westmount home where he had been invited following a meeting: "But Levesque, how can people like you imagine you can run Shawinigan Water and Power?" (Lévesque, 1986). Another historian recounts a similar question put by a Shawinigan Water & Power participant in a meeting Lévesque had called to discuss ways of rationalizing Quebec's power distribution system. Lévesque's response was accompanied by a blow of his fist which broke the glass top of his desk (Thomson, 1984). Soon afterwards he persuaded the cabinet to let him push forward with the process of acquiring control of the electrical system; and the decision to conduct an election was taken at a cabinet retreat in September 1962.

In practical terms, the power company purchases by Hydro Quebec in 1962-63 was part of an ongoing effort to make the electrical system more efficient, and to improve the lot of francophones in technical and management positions. For the engineering firms under discussion, it signalled a lack of government business coming the way of Shawinigan Engineering, and more generally, an increased hiring of private francophone firms to do contract work for Hydro Quebec and other government clients.

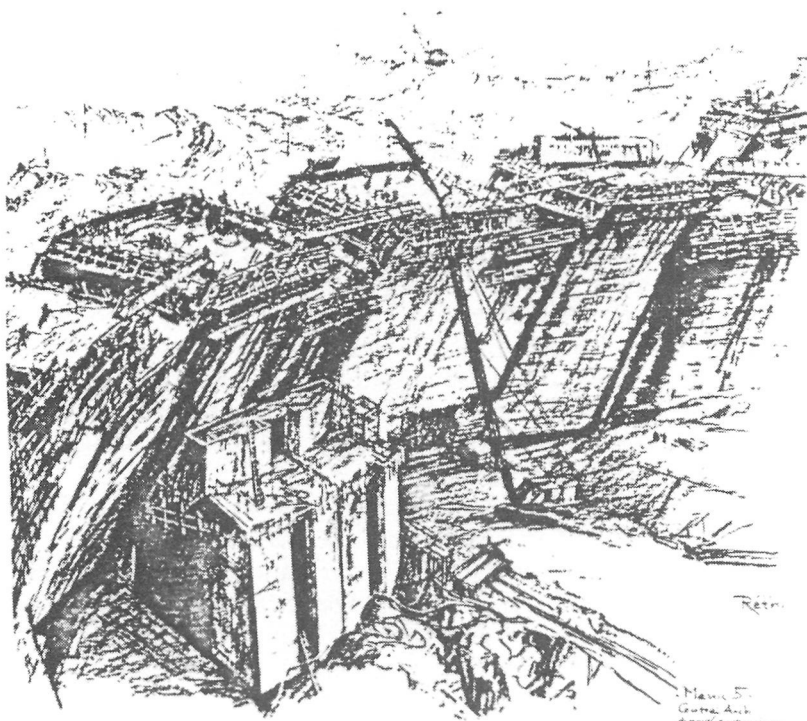
SNC had a long history of totally bilingual management, with strong European and other foreign components. This is reflected in the following quotation (references in long quotations are to Langford & DeBresson, 1990):

SNC has always been a multicultural organization; I mean, we have people from fifty or sixty different technical backgrounds, and they are talking over 60 languages. This was true then, because [Mr. Surveyer and] Mr. Chenevert [were] French Canadian, Mr. Nenniger was Swiss of German descent; [among] the major partners, you always had a mix. At the time, when you were working

MANIC 5

The building of the Daniel Johnson Dam

Lili Réthi and William W. Jacobus



Dustjacket of a book by the European-American artist Lili Réthi and a senior editor of the *Engineering News-Record*, which records the building process of a multiple-arch dam in which SNC and Acres were the major Canadian firms. Daniel Johnson, as premier of Quebec in 1968, was here in the bush 100 miles from the nearest town, Baie comeau, to dedicate the dam when he died. Jacobus ends his text "*Manic 5* was done. A monument had become a memorial." (*Manic 5* was published by Doubleday, New York, in 1971.)

with industry, particularly in the sixties, the language of work that you had to work in was English, and that was it, and that was no problem. And when we were working with municipalities..or the Quebec government, it was French, and that was no problem....We've always been in the position to work in the language of the client...We felt that, since we were a service company, the language was the language of the client. (Jean-Paul Gourdeau, May 1990, p.4)

Thus spoke the chairman of SNC, the oldest Montreal consulting firm still in existence, whose founder in 1911, Arthur Surveyer, maintained close business connections in both linguistic communities. *The language of the client* – it seems to be generally agreed that a major impetus for the growth of consulting engineering in Montreal since 1960 was great leap in the extent to which a francophone client, the Quebec government, was active in providing work.

In Quebec, what was different [from the rest of Canada in 1960] was that the infrastructure had lapsed behind the times, and there was a very much needed catchup program that had to be instigated. That's where consulting engineers in Quebec were favored, by working in that program, rather than increasing substantially the civil service. (Armand Couture, Lavalin, Sept. 1989, p.2)

As you remember, in 1960, Mr. Lesage came to power and Duplessis had done almost nothing in Quebec, from the end of the war until his death, while Ontario and all the other provinces were really taking advantage of the low interest rates to build their road and dams and all kinds of things. But as Ontario and all the other provinces were developing, instead of farming out their work they were keeping it inside the administration, building up their own forces instead of building up consulting engineering firms on the outside...When Lesage came in, he had good quality personnel but they were very few...it was a skeleton staff in the highway department and all that...There was a very very big program enacted for roads, schools, hospitals, dams...He said that he would farm out and try to create new high technology Quebec engineering firms; and because of that, we were there at a time that it was very easy for a young man like me to get the job, because jobs were plentiful, and you didn't have to be the wisest man in the world to be able to convince anyone to give you a job...I was very lucky. (Bernard Lamarre, Lavalin, August 1989, p.2,3)

Bernard Lamarre was just assuming leadership from Lavalin's founding partners, Lalonde and Valois, when the Quebec government assumed this more active role (besides some of these jobs, the firm grew through such federally sponsored projects as the Trans-Canada

highway, including the Louis-Hippolyte Lafontaine Tunnel, and private projects such as Place Bonaventure).

A sentiment expressed at a meeting of Quebec and Ontario engineers in the 1960's illustrated the hope that the principle of farming out engineering would extend to Hydro Quebec as well as to the Quebec government itself:

For gosh sakes don't make the same mistake as Ontario Hydro. Its engineering group has grown so large, it's like the universe expanding, it never stops. And they do their own construction, their own engineering, they have no yardstick to measure their efficiency by, or their proficiency; and they're adamant about letting anybody from the private sector interfere with that empire they've managed to build. God knows you don't want to do that at Hydro Quebec. (recalled by Douglas Denovan, Shawinigan Engineering [retired], May 1990, p. 5)

But the question of the "language of the client" in the case of Hydro Quebec was not as clear as in the regular government departments. Robert A. Boyd joined Hydro Quebec when its main components were Montreal Light Heat & Power Company and Beauharnois Light Heat & Power Company; he presided over the welding of several more power companies, of which the largest was Shawinigan Water & Power, and 44 cooperatives, into a single entity. It was a long difficult process by which Hydro Quebec became a consistently francophone potential client for private firms, as Boyd recalls:

In those days [1938, when Boyd entered Ecole Polytechnique] not many French Canadians – I am mostly French Canadian – were going into engineering...In 1944 I was the first one of a new generation, you know. And besides, it helped me to be bilingual, because all the previous ones were not, or almost not...They were all with Montreal Light Heat and Beauharnois Light Heat, everything was done in English. [In Operations] I noticed that maybe 90% of the people working in the substations, the operators and people like that, were all French Canadians and they had to work in English; they had no instructions or guidance...what little they had was in English..

..So in my spare time I started writing instructions for them...in French at home...and my wife would help me translate. The superintending engineer...a Huguenot...would take the English text, approve that, and put the French one in the drawer...but I continued on, and after three years he was retired and another English engineer succeeded; but he had learned some French and was much more open, so he started signing the French ones also and putting them out, so that was a turnaround for us [1949-50].

It took time. Maybe '54, '55, I was secretary for the engineering and planning committee, a big committee that planned everything in those days, and I had to write the minutes in English....1960 was the year, when the Lesage government came in, and Levesque was the minister, but before that, [unofficially, it started; for example] a commissioner, René Dupuis, who had been dean of engineering at Laval [created] the first real *lexique* or dictionary of technical terms anglais-français in Hydro Quebec..

..Manicouagan was of course the very big thing in those days [late '50's, early '60's], and that's where the Quebec firms [SNC, ABBDL] started to play a very important role if you're talking about consulting engineering. Before that – like Beauharnois and the others, it had been firms from outside of Quebec, like Acres...SNC got a large dam at Manic 5...ABBDL – Asselin, Benoit, Boucher, [Ducharme, Lapointe] – which is still a big firm, they got the power-houses... and then a little bit later, after Churchill Falls there, a group from Acres formed RSW, Rousseau Sauv  Warren, and they are still, you know, the three big firms in hydroelectric; and then Lavalin of today...they got the big boost when they were hired...as a partner in James Bay. (Robert Boyd, Hydro Quebec [retired], Aug. 1989, pp. 1-3)

As for anglophone consulting engineering firms in Montreal, they like the francophone firms were generally small in size in the post-war period (Douglas Denovan remembers a typical project as being the Royal Montreal golf course sprinkler system); their numbers were approximately equal in the 1960's, while in the 1980's they were about one fourth as numerous as francophone firms. (This is based on a quick survey of the names in the directories of the Association of Consulting Engineers of Canada and the Association des ing nieurs-conseils du Qu bec.) There were exceptions: large engineering and construction firms such as Fenco (once part of Foundation Company of Canada, later part of Lavalin).

In power engineering (hydroelectric and other) the two leaders were Montreal Engineering and Shawinigan Engineering, established in 1907 and 1919 respectively. But neither of these was in the general consulting business until the end of World War II. One served the engineering needs of the Canadian and international power companies held by I.W. Killam's Royal Securities Corporation; the other served the Shawinigan Water and Power Company. Both began to work for other clients before circumstances removed their parent/market. Both went through complex "weaning" periods to establish themselves as independent consultants, Montreal Engineering's more extended and less traumatic than Shawinigan's. Both found their pasts both a blessing (in engineering reputation and experience) and a curse (in lack of marketing experience). And both, by the end of the

eighties, were under the control of other firms (Shawinigan was acquired by Lavalin in 1982; in 1988 a controlling 45% interest in Monenco was acquired by Majestic Contractors, a subsidiary of Perini Corporation, Massachusetts; it has since been re-Canadianized by Agra in Calgary).

Although Montreal Engineering did outside work earlier (Operation Habbakuk during World War II, which explored the possibility of aircraft carriers made of ice and wood pulp; federally sponsored power supply for mines in the North West Territories; Iron Ore Company of Canada in northern Quebec, for example), the company's independence was precipitated by the death of Izaak Walton Killam in 1955 and the breakup of his empire of power companies in western Canada, the Maritimes, the Caribbean and Latin America. The blow was cushioned by long term contracts with its members, ending about 1970. But the difficulties of the weaning process were evident in the changeover of leadership from company officers who were also power company officers (Gaherty et al. below) to its new leadership under Chris Ritchie in the 1960's, as J.K.C. Mulherin recalls:

During the Gaherty-Krug-Thompson-Stairs regime, their interests were far more in protecting the interests of their power companies, and I would say almost to the point of minimizing the profits of Montreal Engineering, in the interest of keeping the cost to the power companies down. The change of direction, of course, was that we wanted to deal with these people on a commercial basis, just as though we were any other consultant. And also, they weren't too keen about our taking on too much what they called "outside" projects because they didn't want the good people diverted from their projects to outside projects. (J.K.C. Mulherin, Monenco, May 1990, p.4)

Shawinigan Engineering originally had a smaller sphere of operations: the many power sites of the St. Maurice River and other parts of Quebec served by Shawinigan Water & Power subsidiaries:

Initially we were loaded to capacity by handling the demands of the Shawinigan Water & Power Company for new generating stations, transmission substations, and transmission lines...As the sites became more marginal and as we were running out of water rights, Dr. Hartz [president from 1951] had the vision to see that perhaps we'd better start increasing our market.....He had the reputation, he knew people in Canada in the engineering field; he was well known because of his wartime contribution, you know:

he worked for the wartime maritime shipbuilding effort of H.R. Macmillan of Macmillan Bloedel that built all the liberty ships down here for the war effort. He was permitted to leave his job with Shawinigan Engineering – you know C.D. Howe had all these dollar-a-year men. That's what these big companies did for the war effort – they let some of their best men go into these wartime corporations, in planning and managing and expediting positions, and they did a fantastic job...When you get into something like that, you meet a lot of people ...all across Canada, and in England, and in all the [allied] countries. And so Dr. Hartz became knowledgeable of all these people...and of course this reputation that Shawinigan had for..performance... all this brought electrical business to light: [B.C. Electric; Alcan; New Brunswick Power; and Brinco at Churchill Falls]...but unfortunately we didn't do that design, because when it became ready for development, we had just been nationalized by the Quebec government. (Douglas Denovan, Shawinigan Engineering, p.3)

Although Shawinigan Engineering had broadened its clientele before 1962, it suffered, in the view of Denovan and others, from the lack of foresight shown by Shawinigan Water & Power. Refusing to believe in the possibility of its being taken over, the company had neglected to take any steps to smoothe the path of its non-electrical subsidiaries in such an eventuality. In quick succession, Shawinigan Engineering found itself the property of the Quebec government, Power Corporation, and finally its own employees; it had lost its major client and was in an uneasy political position in Quebec where its activity had been concentrated.

Although Montreal Engineering, and to a lesser extent Shawinigan Engineering, grew and diversified both technologically and geographically in the 1970's, some problems due to lack of marketing experience were acknowledged. As Denovan said, "The trouble with some of the people in Shawinigan Engineering in those days was, they were damn good engineers, but they weren't very good businessmen; in fact, most of us were in that category." (p.4) Mulherin conceded that Montreal Engineering had "absolutely the same problem. Never had to go out and find work until the last [few] years." (p.5)

In assessing the reasons for Lavalin's takeover of Shawinigan in 1982, Couture noted the synergy between Lavalin's experience of the management of hydroelectric projects, and Shawinigan's experience in the actual design. (Couture, p. 7) But as for why Shawinigan was up for sale, Marcel Dufour harked back to its historical handicap:

Shawinigan...were not used to running after the work, the contracts. They were used to being given by Shawinigan Water and Power anything they

needed. They were good engineers, but I don't think they had good commercial people...They were sitting down and waiting for the work to come to them by itself.

During these years there were quite a lot of changes in the firms of consulting engineering – the last 25 or 30 years, the engineers started to run madly to get jobs. And at the time you were sitting in your office and waiting for somebody to give you a job, you know, just like a doctor. But this is not like that today. I remember Mr. Valois used to tell us over here: "Nobody will come to you in your office; you don't need a big office because nobody will come to give you a job in your office; you have to go to his office to get the job." (Marcel Dufour, Lavalin, Sept. 1989, pp.7-8)

George Scruton said of his firm between the late '60's and early '80's, "We existed, we flourished to a certain extent, but we got into financial problems when we tried to get into some very large projects that did not materialize. Around 1982, the banks foreclosed and we sought an association with Lavalin." (George Scruton, Shawinigan/Lavalin, July 1989, p.5)

All of the major engineering firms expanded outside Quebec and outside Canada between the sixties and the eighties; it was a frustration to the anglophone firms that they did little business *in* Quebec. Mulherin of Montreal Engineering said, "We as anglophones could not get any business from the province of Quebec, particularly Hydro Quebec [except through the Monenco subsidiary La Société d'Ingénierie Cartier]" (p.3) One of the greatest difficulties during his presidency, 1974-1990, was "in trying to deal with the problem here in Quebec. That was really, you know, the biggest source of puzzlement: how the hell could we counteract that?" (p.6)

Denovan of Shawinigan Engineering remembered early efforts to get francophone students from McGill and Ecole Polytechnique, but they would work only as summer students, and would not return after graduation. "There was one, Marc Benoit, when I joined in '48; he was my [first] boss, [but] Marc left to form his own firm: Asselin, Benoit, Boucher, Ducharme, Lapointe." (p.4) (Marcel Dufour of Lavalin also worked briefly for Shawinigan Engineering.) It seems clear that francophone engineers in the immediate post- World War II period found the atmosphere of anglophone firms uncongenial. Scruton concludes: "I think.. that to exist in the Montreal context the firm must be French speaking, and although we tried, as an essentially English speaking firm, to become French speaking, it's only with the association with Lavalin that we have become a dominantly French speaking firm." (p.5)

THEME II: HYDROELECTRIC ENGINEERING AND JAMES BAY MANAGEMENT

There is no doubt that the James Bay project of the 1970's gave a great boost to the consulting engineering business in Quebec, not only hydroelectric, but the wide variety of other domains needed to reach and open up an undeveloped terrain. A major controversy arose over the overall management of the project, and while it of course influenced the proportion of participation awarded to particular firms, it also illustrates a conflict inherent in a government-as-client situation, given a particular stage of evolution in the consulting engineering profession. That is, large engineering firms had increasingly come to conceive of their task as a total service, with management and engineering services offered in the same package, whereas Hydro Quebec felt a responsibility both to increase its own engineering competence and to retain overall control, while keeping the provision of management and of engineering services strictly separate. Put in the simplest way, the former view, exemplified by an SNC-Monenco-Janin bid, lost out to a team consisting of Hydro Quebec through its subsidiary SEBJ (Société d'énergie de la Baie James), the American giant Bechtel, and Lavalin. In what follows, the process of choice, affected of course by considerations of chronology, personality, and politics, is reflected in the reminiscences of some major participants. First, Robert Boyd:

We [Hydro Quebec] had worked alot with SNC, ABBDL, and the others at Manic-Outardes, but there was one thing in which we were not so strong and that was cost control...We had to go at it so fast, you know: in '60 we took over Carillon from Acres, and Perini, the contractor from the U.S. who was chummy with Duplessis – from Carillon to Bersimis to Manic the succession of big jobs was so fast that we could not build up the proper competence at Hydro Quebec in management of cost control...We saw how Acres/Bechtel had done a good job at Churchill Falls...We didn't need Acres because ...we had our own [engineering] firms in Quebec (ABBDL,RSW,SNC).

But we needed Bechtel for their experience in construction and cost control, and we planned that way. Of course the politicians took it a step further than I wanted. They wanted to give the management to Bechtel, to which I said, "Over my dead body! I like Bechtel but I like them working for me, not over me."

...I said either Hydro Quebec or SEBJ will be the manager. That was a BIG fight, a very big fight, because some politicians had made the promise to Bechtel they would have the management...We had a big fight and eventually

I won that one. And that's where we got into a problem with SNC: they were supposed to be in the picture also very strongly – they wanted the management also. SNC wanted the management, Bechtel was promised the management, and I wanted Hydro Quebec and its subsidiary to be the manager....[When René Lévesque, as a newspaperman in 1972, asked why the HQ-Bechtel-Lavalin team] I said [among other things] the engineering firms we had, like SNC, ABBDL, RSW...should not be in management, because we needed them so much to do the engineering. One of the principles was: if you've got an engineering job, you don't get a management job.

That's *not* evident, it wasn't evident then; if you're in engineering you're not in management. You can't do both *unless you're the owner*. (Robert Boyd, pp. 5-6)

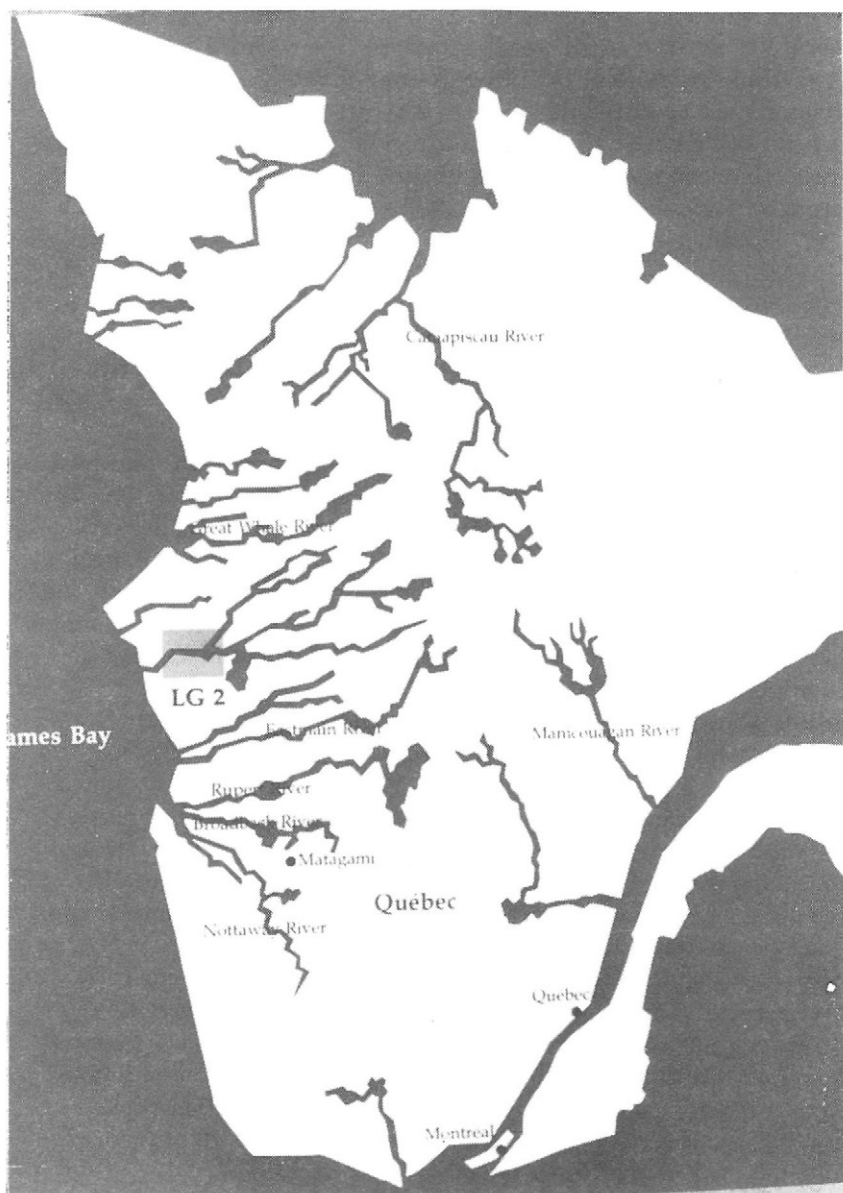
Boyd was clearly promoting a type of public-private collaboration not popular with most of the private firms at that time.

As president of SNC at that juncture, Camille Dagenais was reluctant to comment on the choice of team, but on the policy of separation between management and engineering, he said:

I can only answer from where I stand; for the benefit of consulting engineering, and the environment in which we [work], which is the environment in which you have to be able to do the whole thing... from the point of view of making the consulting engineer companies in Quebec become larger and very important and capable of being competitive with some of the bigger ones outside, it was not a good move. You have to be able to do the management, and the engineering, and the whole job.....[From] the government's point of view, I suppose that they had many reasons to divide the work into many. (Camille Dagenais, SNC, June 1990, p.6)

Jean-Paul Gourdeau, Dagenais' second in command at the time, also felt that to obtain jobs abroad, a combination of experience in large project management and engineering expertise was necessary. He mentioned other factors in the choice:

The government decided that there should be a separate company, the energy corporation...the president was Mr. [Pierre] Nadeau. He decided that he wanted to have a complete separate team, and this is when we were asked to form a consortium ...we made an offer, and I guess there was a confrontation with Hydro Quebec...Mr. Nadeau lost out and Hydro Quebec decided that they wanted a new group, and since we [had been] asked to form a group with M. Nadeau, we couldn't be the fair-haired boy of the new group, and so we lost out. Like anything else, in a project like this you do your best, but there is no second prize; you either get the job or you don't. (Jean-Paul Gourdeau, p.5)



This map, from the *LG2 Diary*, shows the major sites targeted by Hydro Quebec from Manicouagan (1950's) to the future. The Saint Maurice River, which flows south into the St. Lawrence at Trois Rivières, between Montreal and Quebec on the north shore, after going over Shawinigan Falls, is not shown (Source: Société d'énergie de la Baie James, *LG2 Diary*, Frontispiece)

Robert Boyd's analysis of this transition included the following remark: "The government wanted to leave Hydro Quebec out of it, so they could have more of their fingers in it" (Boyd, p.7)

In contrast to the SNC-Monenco-Janin proposal, Lamarre and Couture describe small scale approaches to working with Hydro Quebec that eventually paid off in "the big enchilada" as Lamarre referred to it. He said:

[In 1967-68] after a lot of pushing and a lot of discussion, we finally persuaded [Hydro Quebec] to give us *something*, so they could test us...no more than 3-5 people working on that project, over a period of two or three years, but because the team was so small, I was with them almost all the time at Hydro Quebec, and it gave us access to the technical people there...

When the James Bay project was announced in 1971....we were the underdog, and at that time SNC and Monenco and Janin had formed...a totally Canadian consortium....and they made two mistakes in their proposal: first, they excluded us – I wanted to be with them but they said no – and the second thing, I guess that they wanted to take over the complete management of the job, and it was too much for Hydro Quebec to swallow, because they wanted to do the project, they wanted it to be an integrated team. (Bernard Lamarre, p.4)

Couture, the member of Lavalin most closely involved in the James Bay project, recalls:

First Lalonde & Valois at the end of the 1960's developed some good relationships with Hydro Quebec, because I believe we were the first firm that looked at consulting work not as independent work, outside of Hydro Quebec, but we developed the concept of technical assistance in which we would use our engineers and technicians mixed up with the engineers and technicians of Hydro Quebec. [Usually] when work was contracted out, the consulting engineer worked extremely independently from the technical staff of Hydro Quebec; they reported almost directly to the head of Hydro Quebec. [For us] it was possible to have this kind of a relationship where we would form a team coming from the expertise source of Hydro Quebec and the expertise source of the consulting practice...[this] helped us at the beginning of the '70's to get involved in the project as we did.

[As for other reasons for the presence of Lavalin on the management team,] there were potentially three clients...SDBJ,..SEBJ...and Hydro Quebec. People aligned themselves according to who they thought would be in the driving seat...we chose to do most of our promotional work and develop our proposals

with Hydro Quebec, and as it turned out they were selected to direct the whole development, I think this was probably the most important factor in obtaining the assignment. (Armand Couture, p.3)

Boyd, who was president of SEBJ (Hydro Quebec version), sums up the operation of the eventual team:

The big responsibility of James Bay was getting this structure going and selling the idea of how it was going to work: first, you can't be an engineer and a manager;... [second] the work had to be done in French. Third: how to integrate three firms like that: Hydro Quebec with its big hat; Bechtel was a bigger hat internationally, they thought everything they did was right; and Lavalin, who was really growing. I had to knock in their heads a lot: there's ONE company, SEBJ; we ALL wear the SEBJ hat, forget the other hats, and the way it's going to be done is the way we discuss, and this is OUR way. (Robert Boyd, p.7)

The James Bay project undoubtedly provided a boost to consulting engineering in Montreal: to the many civil engineering firms involved in infrastructure; to the three principal hydroelectric firms – ABBDL, RSW, and, to a much lesser extent than hoped, SNC, whose involvement included the LG2 powerhouse; but above all, to Lavalin. SNC and Monenco, both of whose former presidents have cited Bechtel as their model (Mulherin, p.6; Dagenais, p.4), had already participated in major projects overseas, and continued to do so; they also expanded in the oil and gas industries.

Lavalin's participation in the James Bay project allowed it to grow – financially, technologically, and geographically – to a position equalling and surpassing its Montreal competitors. By comparison with them, Lavalin was lacking in hydroelectric experience (which, according to the principle of separation of engineering and management, would have been of little use anyway for James Bay); this lack was filled by the acquisition of Shawinigan Engineering in 1982, during the lull following the completion of James Bay, phase 1.

In summary, the most basic issue in the choice of management teams for James Bay I, aside from all the political considerations, appears to have been the conflict between the total service concept, which is analogous to the concept of "turnkey" plants and the "black box" view of technology, in which the expertise is exercised only by the chosen experts; and the concept of cooperation among different organisms, public and private, representing different political and entrepreneurial purposes, in the carrying out of a major project.



The spillway at La Grande 2 (LG2), major installation of James Bay project, phase 1. (Source: *LG2 Diary*, p.99)

CONCLUSION: FORCED TOGETHERNESS

The desire to work alone, to have complete control and responsibility for a project, as the simplest way to do an efficient job, was common to all of the firms. In cases where a firm needed new expertise, the method of spawning its own subsidiary or buying an orphan or dying firm, was common. In many other cases, joint ventures were formed where either political interests (e.g., host governments to Canadian firms working abroad) or technical requirements (e.g., hydroelectric experience in difficult climatic conditions) made it necessary to cooperate.

Some projects were of such a grand scale that no one firm could do it, and be afterwards able to support the enormous staff that would be required to complete such projects. In order to obtain federal (e.g., CIDA – Canadian International Development Agency, EDC – Export Development Corporation) or international (e.g., World Bank) funding for projects abroad, cooperation has often been required, taking the form of a consortium. These have been seen as unattractive, but essential, means of obtaining projects. Some responses, when asked about the extent of participation in consortia:

As little as possible! We're big enough to swallow all the engineering firms in Canada..we probably have 15% of all the engineering manpower in Canada..we operate in all types of fields, so why should we join a consortium? ...Unless there is a special reason...(Dufour, president of Lavalin International, p. 5)

Let's put it this way. In some cases it's necessary. (Gourdeau, SNC, p.7)

[In the seventies] with the exception of the Malaysian work virtually everything we [Shawinigan] did overseas or in Canada was in consortium with either Montreal Engineering or Acres or somebody else. It was a sad thing, but that's what happened. (Denovan, p.6)

Many projects..can only be done that way, because the scope is big and the skills are very many...ten years ago, it was more that you had to put up with it. In the mid seventies there was no way [Bechtel] were going to work with anybody else; that was part of their philosophy...When they did it the first time, it was because there was no other way for them to get the job. (Dagenais, SNC, p.7)

Two major reasons cited for consortia were to meet the expense of the scale and/or difficulty of a project, and to facilitate the distribution of Canadian government support:

Jack Hahn [from SNC, with whom Douglas Denovan went to school] used to say to me, "Doug, it's crazy. Here we are, Shawinigan, Monenco, Acres, we all go out competing on the same jobs overseas, and the Japanese, the Germans, the Dutch, the British, are coming in with a single national bid." ...We join hands to share the risk of the costs of bidding, because it costs money to get a job.

Sometimes there's another motivation, that CIDA can't be handing out work to [any one company] all the time...there'd be an outcry of abuse, patronage...[so] part of it is to make it easier for the Canadian government to help finance the project. (Denovan, p.6)

The case of C.I.P.M. (Canadian International Project Management) demonstrates both the attempt to meet the expense of getting access to China, and the simplification of the distribution of Canadian government support. This ongoing consortium, which has done hydro-electric studies including the Three Gorges project on the Yangtze River in China, has included SNC, Acres, and Shawinigan, plus Hydro

Quebec and B.C. Hydro. (Monenco dropped out several years ago, because of philosophical differences; according to Mulherin, p. 6, "We always approached things on the cheap, and those guys, it seemed to me, wanted to do things in a grandiose manner, and hire very high paid executives who would run around the world and search for projects.")

In addition to scale considerations and facilitation of government financing, Dagenais notes a more political factor that has increased the use of consortia:

Political nationalism in many countries: engineers in Peru or other places are like us as we used to be, in 1953, when we were taking jobs away from Acres, saying, "Hey, this is Quebec, that firm is in Toronto."

..those people down there are doing the same thing; so you have to form a consortium with the locals. We have an office in Tunisia now, with a local organization, and I don't think you can do work any more in those countries unless you organize that way. (Dagenais, p.7)

The larger Montreal firms have been in a position where, in the words of SNC's Gourdeau, "The market in Canada is not sufficient to warrant an organization like ourselves," (p.9); and yet they needed the financial and technical resources to compete with yet larger firms in the world market. The use of the consortium is one path to the necessary flexibility.

But in the present case(s), it has not been enough. Lavalin's continuing diversification hit a snag when it acquired a petrochemical firm Kemtec (formerly B.A.-Shawinigan, a subsidiary of Gulf Canada, which in turn was then owned by Gulf Oil U.S.; the Reichmanns bought Gulf Canada in 1985, and Lavalin picked up one of the left-overs). When recession hit, the cash drain was too much, and the ultimate outcome was the joining together of the two leading engineering firms.

The merger of SNC and Lavalin, while sad for Lavalin, marks yet another leap in the spectacular rise of consulting engineering in Montreal. What had become the two largest firms of their kind in Canada became the fifth largest in the world.

FACING THE FUTURE

With Shawinigan, Lavalin, and SNC all wearing "one big hat" (to use Robert Boyd's phrase), the firm SNC-Lavalin will continue to evolve in concert and competition with other firms in its class. Several ques-

tions arise as to the firm's future; we will make observations on only two:

- 1 How will the corporate structures and cultures react to the merger, especially in the case of hydroelectric power engineering?
- 2 What problems and opportunities will the relationship with Hydro Quebec present, in the context of the second phase of the James Bay project at the Grande Baleine/Great Whale River and elsewhere?

As to structural and cultural evolution, we can begin by noting some structural changes that have taken place: Bernard Lamarre and Marcel Dufour are now consultants located adjacent to SNC-Lavalin president Guy Saint-Pierre in the SNC building on Boulevard René Lévesque near Hydro Quebec; the energy and mega-project division, one of four major subdivisions of the company, called SNC-Shawinigan, is located in the former Lavalin headquarters in the Laurentian Building a few blocks west on René Lévesque. It is far too soon to analyze structural change in any depth.

A question of special interest to historians as "company genealogists" is that of the process of fusing and/or clashing of cultures in company mergers. We may begin with the idea, common in the social sciences, that in the encounter between two previously separate cultures, the process of acculturation may produce something entirely new, containing elements of the cultures of the old components; and creating a new entity which (depending upon the relative power of the two entities, and upon the desires of the managers) may or may not retain the characteristics of *both* components.

We will take the culture of the now dominant SNC component as given: a more or less typical world-class, internationally and multiculturally oriented, bureaucratic organization operating in the consulting engineering, construction, and manufacturing sectors. The question of the survival of the Lavalin and Shawinigan identities is an interesting one.

As for Shawinigan, at least its name has been preserved, and as long as projects started before the merger continue, the group of engineers employed by the former Shawinigan-Lavalin subsidiary of Lavalin will function as before. It is only as new projects are begun that the creation of a new, fused identity will begin to form.

An extremely useful perspective on this process was provided by an interview with Jo-Ann Paquet, whose career also reflects some important tendencies in the evolution of the engineering profession. As representative within SNC-Shawinigan of a group temporarily labelled "groupe corporatif en qualité," she works to monitor and improve what is often called in English "total quality management," a term

whose definition includes attention to interaction with the client, and to favorable working conditions for employees. While a discussion of this concept is out of place here, she stated strongly her conviction that "quality" is indeed something that must be managed, or fostered; it is not something that occurs automatically (as anyone who has experienced arrogance in "expert" consultants, or stultifying working conditions, will testify). Her particular mandate is to smoothe the transition as SNC and Shawinigan engineers begin working together on new projects.

Jo-Ann Paquet's career illustrates the speed with which the modern engineer may move into administration; graduating in metallurgical engineering from Laval in 1983, she worked only four years in that field with Alcan before entering the field of quality control, or quality management, joining Lavalin in 1990.

Disons que je n'ai pas la réputation d'être le parfait stéréotype de l'ingénieur. Je suis peu intéressée par les machines; je suis beaucoup plus attirée par les gens qui opèrent les machines. C'est la raison fondamentale qui m'a amené à m'intéresser à la gestion de la qualité. (J-A Paquet, April 28, 1992)

The career trajectory by which the management of people succeeds the process of producing designs, specification, and machines as the principal interest of engineers, is increasingly common as the relative importance of *project design* rather than planning the manipulation of material objects becomes the central function of an engineering firm.

A tendency toward democratization of the workplace was also evident in the fact that the Association québécoise de la qualité (of whose Montreal region Jo-Ann Paquet was president at the time of our interview) includes members from retail stores with three employees as well as from firms the size of Bell Canada.

An aspect of "company culture" which emerged from several visits to Lavalin is the unusually widespread prevalence of beauty and care in the design and decoration of the workplace, and the prominent position given to the visual arts, leading-edge and modern as well as traditional, not just in the boardrooms but throughout the building, extending to a public gallery in the basement. Art had clearly been more than a good investment and a way of making corporate clients feel more at home in the executive offices as is the case with many companies. At the second interview (April 28, 1992), when Bernard Lamarre had slightly (but not much) more time than he had had as president of Lavalin, to give to questions not strictly of a business nature, we asked him whether this pervasive evidence of the love of

art had been a self-conscious plan or had just happened. It emerged that, while it had started as a hobby, it had assumed an important role in company management:

It started as a personal interest...my wife, our family, were always interested in art, especially the visual arts; as a young couple we visited museums...I became almost an art addict. At first we kept that for ourselves, but later – you cannot separate yourself and have it in your home, and come into the office where it is completely different. So we started to bring some works of art into the office. When I brought Leo Rosshandler in, it was a very definite policy to try to integrate works of art within the work environment.

..[we thought that] if we brought in meaningful works of art, by interesting the personnel and raising their curiosity in visual arts, they would also have curiosity for other forms of art...Of course the first time we brought in modern works of art, they thought we had fallen on our heads..

You know, they were not used to that, didn't have much contact with it, but they started to ask themselves questions – what was behind the abstract, and all that – from that we went to maybe music...If you are curious about art, then you start also to be curious about what you do every day of your life in engineering, and you start questioning the methods you have been applying all the time; maybe there is something that could be changed... it's creating a very intensive intellectual debate; it's good for everybody, on the art side and on the technical and business side. (Lamarre, SNC-Lavalin, April 28, 1992)

It seemed to us, after seeing this company in operation in 1989 and 1990, that Lamarre and his associates had set (and presumably will continue to set, in other ways), an example of the possibility of a humane, culturally rich environment in a technological, traditionally arid and forbidding, part of the economy.

Lamarre went on to tell how, even before he had a public gallery in the basement, they arranged travelling exhibitions, to make Quebec artists known in the west, and western artists known in Quebec – “at least, to bring those two solitudes together on something on which there was not any big discussion....you know, you don't knock heads off with art. You don't need to speak French, or English, to communicate...” Thus art was a instrument of change, not only within the company environment, but in the surrounding society.

We will address only briefly the second question posed about the future of the combined firms in their relationship to Hydro Quebec, particularly in reference to James Bay, phase two, the Grande



^
 SUZOR-CÔTÉ
 Marc-Aurèle de Foy
 «le dégel de la rivière Nicolet»
 1925
 Huile sur toile
 102,8 x 138,6 cm
 Collection: Musée du Québec

>
 BOURASSA, Napoléon
 «Jeune homme à genoux', 1890
 Aquarelle sur papier
 33 x 20,2 cm
 Collection: Musée du Québec



From the catalogue of an exhibition in the Galérie d'Art Lavalin, 1988. Under the guidance of Léo Rosshandler, Lavalin staff and the public were exposed to a wide range of traditional, modern, and avant-garde art by Québec and Canadian artists. Examples above courtesy of the Musée du Québec.

Baleine/Great Whale project. Here the ecological factor has become much more prominent than in the past. In the sixties, seventies, and eighties, and well before, great dreams of power production as an economic engine of development were realized. With this actualization came the evidence of the invasive effects on the social and ecological balances that had existed before these developments. The James Bay agreement of 1975, which temporarily resolved, or at least contained, the conflict between ways of life and holders of various kinds of property rights in the region of the La Grande project, will have to be succeeded by a new set of arrangements, in which local and international environmental groups are playing a more visible role than before.

The same set of questions, revolving around the conflicts between the forces of development and the interests of the ecologically affected, will arise (have arisen) in connection with the Yangtze River Three Gorges project, in which SNC-Lavalin is involved with many others, and which implies the displacement of a much denser population.

Many of the people interviewed, retired or not, will no doubt play important parts – none more so than Armand Couture, as Lavalin's representative for James Bay I, and as president and chief operating officer of Hydro Quebec now. Those histories, in Canada, as in China and elsewhere, remain to be lived, as well as written.

* * *

Oral history can provide an evocative supplement to the study of the technological, as well as financial, cultural, and other exchange processes that underlie the metropolitan nature of Montreal. Oral history permits investigators to get a feel for the real-world, quotidian operations of large, as well as small, firms, and to understand differences not always reflected in financial reports, business pages, and economic analyses.

In the present case, our hope is that the extraordinarily long and strong internationalist tradition of SNC, and the equally extraordinary entrepreneurship, including in particular the way in which the creation of a consciousness of and love for the visual arts has been encouraged to permeate the entire corporate culture and hierarchical structure at Lavalin, will both be retained in the future of SNC-Lavalin.

In looking at the role of Hydro Quebec in the rise of consulting engineering in Montreal, we have not attempted to analyse or assess the behaviour of Hydro Quebec itself (this is being done at CREDIT and elsewhere). We have instead emphasized the USE made by Montreal firms of the opportunities and environment provided by the policies of Hydro Quebec and of the Quebec and federal governments

between 1944 and 1992. Plans, actions, and events determining the next chapters are already in process, and it will be interesting to see what forces in the local, regional, national, North American, and world environments – social, political, economic, and ecological – will dominate the process, and the discussion in the media, of the continuation of the story told here.

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ACKNOWLEDGEMENTS

Without the imagination of Loren Lerner at Concordia University, and the generosity of Shell Canada, this project could not have been done. The background research was made possible by a SSHRC grant to Jean-Claude Guédon. We are extraordinarily grateful to the engineers interviewed, who took time out of very busy schedules to talk to us. In addition, several other people

provided useful information; special thanks to Larry McNally of the National Archives of Canada in Ottawa, and to Jean Rousseau who helped build the town of Caniapiscau to house James Bay workers (as well as our Laurentian retreat), lent documents, and provided more leads than I was able to pursue before publication. Jocelyne Savaria assisted with the transcription of the French interview (Jo-Ann Paquet).

– MWL

APPENDIX: SUMMARY OF INTERVIEWEES & INTERVIEWS

Tape #1, July 27, 1989, 1 hr.:

GEORGE H. SCRUTON, b. Ottawa, Ont., 1926; Queen's University; engineer, Shawinigan/Lavalin. Originally with Shawinigan Water & Power, Scruton became one of the employee-owners of Shawinigan Engineering upon its parent's acquisition by Hydro Quebec in 1963. He has remained with the firm through its acquisition by Lavalin in 1982. The interview covers his career and it reflection of aspects of changes for consulting engineering over this period: from private to public utilities; from project- to system-oriented power engineering; toward expansion across Canada and abroad; toward development of joint ventures, and toward dominance of French-speaking firms in Quebec.

Tape #2, August 14, 1989, 1 1/2 hrs.:

ROBERT A. BOYD, b. Sherbrooke 1918; Ecole Polytechnique; retired president, Hydro Quebec. Boyd talks of his classical education, Ecole Polytechnique, and career at Hydro Quebec from 1944, the year of its founding, through his presidency of the Societe d'énergie de la Baie James (1972-77) and of Hydro Quebec (1978-1981). He recalls his efforts, as a French Canadian engineer, to introduce the use of French in operations. He tells how, as general manager, he worked for the integration of the power companies and cooperatives after 1963, and recalls taking part in negotiations for Hydro Auebec's use of Churchill Falls power. He discusses how the Lesage government's policy of contracting out engineering work fostered such firms as SNC, ABBDL, and RSW in the hydroelectric field, and Lavalin in project management; and how firms were chosen to play various roles in the James Bay project. He comments on the past, present, and future of Hydro Quebec, particularly in relation to engineering.

Tape #3, August 25, 1989, 1 hr.:

BERNARD LAMARRE, b. Chicoutimi, 1931; Ecole Polytechnique, Imperial College of Science and Technology, London; president,

Lavalin. Lamarre recalls his youth in the Saguenay, education at College Mont St.-Louis, Ecole Polytechnique, and in London, and his marriage to the "boss's daughter," as events preceding his career with Lalonde Valois (founded 1936; now Lavalin) which he has headed since the early 1960's. He mentions his involvement in such major Montreal projects as the Louis-Hippolyte Lafontaine Tunnel and Place Bonaventure. He tells about the process of obtaining and carrying out, with Hydro Quebec and Bechtel, the role of project management for the James Bay project from 1972. Lavalin's expansion, including the acquisition of subsidiaries from Photosur in 1968 to Shawinigan/Lavalin in 1982, is discussed.

Tape #4, September 15, 1989, 1 hr.:

MARCEL DUFOUR, b. La Malbaie 1925; Ecole Polytechnique, Harvard; president of Lavalin International. Dufour recalls his education at Ecole Polytechnique and at Harvard in soil mechanics; his early work at Shawinigan Engineering and his career with the Lavalin subsidiary National Boring and Sounding, which specializes in soil work, and has expertise in underwater projects. Dufour discusses reasons for and characteristics of Lavalin's expansion overseas (projects include roads in West Africa, ports in Indonesia, natural gas plants in the U.S.S.R.). Other topics include the acquisition of Shawinigan/Lavalin; the nature of competition in the international market for engineering services; and the differences for a young engineer between the present and the 1950's.

Tape #5, September 22, 1989, 1 hr.:

ARMAND COUTURE, b. Quebec 1930; Laval; vice-president Lavalin. Couture recalls his beginnings in Quebec city; early career including work-study combinations: National Harbours Board/master's degree at Laval; Fenco/ further study at UC Berkeley. He helped set up the consulting firm Per Hall, which collaborated on the Lafontaine Tunnel; this led to his joining Lavalin. Couture discusses interaction with Hydro Quebec during and after Lavalin's selection as part of the James Bay management team; his personal role as Lavalin's representative, and his responsibility for the negotiations on the environment and with the native people. Couture also discusses the reasons for the purchase of Shawinigan Engineering, of which he was in charge. He mentions the Three Gorges project in China, and summarizes the evolution of the nature of the organization of the work done by large consulting firms over the last few decades.

Tape #6, May 16, 1990, 1 hr.:

JEAN-PAUL GOURDEAU, b. Quebec 1925; Laval/Ecole Polytechnique, Harvard; chairman, SNC. As well as his early life and education, Gourdeau, tells of his ten years in the Quebec department of health, followed by his hiring by SNC in 1961 to set up a municipal engineering department. He tells of SNC's multicultural nature; of the company's succession from Surveyer, Nenniger, and Chenevert to a broader partnership, employee ownership, and public, employee-controlled ownership. He notes the change from engineering services by disciplines to "total service." He analyses the reasons for SNC-Monenco-Janin's loss of the project management contract for James Bay. SNC's international expansion, development of subsidiaries, joint ventures, consortia such as Canatom, and venture projects are mentioned. Gourdeau tells about the development of core areas in addition to engineering-construction in order to counteract cycles in engineering business – most prominently defence manufacture. Research and development is being pursued in environmental technologies. The selection of Guy St. Pierre as president in 1989 is described. Gourdeau mentions SNC's contributions to Montreal, and summarizes the growth of Quebec firms like SNC and the challenges facing such firms which are larger than the Canadian market alone can support.

Tape #7, May 24, 1990, 1 hr.:

J.K.C. ("CON") MULHERIN, b. Grand Falls, New Brunswick, 1925; University of New Brunswick; president of Montreal Engineering/Monenco 1974-1990. Besides his youth and education during World War II, Mulherin describes meeting the Killams, of Montreal Engineering's parent Royal Securities Corporation, after joining the firm in 1946. The company's Maritime connection, through Professor Earle Turner at UNB, and other from Killam down, and its Alberta connection, through Killam's Calgary Power Company, are mentioned. Mulherin tells of his early assignments, which were among Monenco's first for outside clients: power developments in the North West Territories, Yukon, and northern Quebec (Iron Ore Company of Canada). He outlines Monenco's early role in Churchill Falls, and limited role in James Bay. Aspects of the process of expansion (international work beyond that done for Killam's central and South American utilities; joint ventures with Shawinigan Engineering and others; entry into the oil and gas industry) are mentioned, as the successive stages of reorganization following Killam's death in 1955: replacement of the longtime leadership of Geoffrey Gaherty, Denis Stairs, Frederick Krug, and Harry Thompson, by an

employee-owned company headed by Chris Ritchie in the early 1960's; public ownership in 1969; regionalization in 1982; and purchase of a controlling interest in Monenco in 1988 by Majestic Contractors, a subsidiary of the U.S. construction firm Perini.

Tape #8, 8a, May 25, 1990, 1 1/2 hrs.

J. DOUGLAS DENOVAN, b. Outremont, 1925; McGill; engineer, Shawinigan Engineering-Shawinigan Lavalin, 1948-1988. Denovan recalls his early life and education, and his forty-year career with Shawinigan Engineering. His acquaintance with the company is enhanced by the fact that he became the son-in-law of Richard A. Heartz, who began with the company in 1920 and was its president (1951-61) and chairman (1961-71) during the crucial years of its transition from a subsidiary of Shawinigan Water & Power to an independent, employee-owned company, a process which Denovan describes. Denovan also tells of his early project experiences, Shawinigan's expansion to outside clients, international projects such as a Malaysian hydroelectric development aided by CIDA, extensive participation in consortia under the presidency of Ken Gray (an Australian recruited for nuclear work in India) during the 1970's. The unsuccessful reorganization of Shawinigan Engineering into the Shawinigan Group headquartered in Toronto in 1977, the acquisition of the company by Lavalin in 1982, and its likely disappearance, are mentioned.

Tape #9, 9a, June 11, 1990, 1 1/2 hrs.

CAMILLE A. DAGENAIS, b. Montreal 1920; Ecole Polytechnique; former president and chairman, SNC. Dagenais describes his youth in Montreal's Little Burgundy, his education at St. Henri high school and Ecole Polytechnique, night studies at HEC, and early jobs at C-I-L and H.J. Doran, leading to employment, partnership and in 1966, presidency of SNC. He recalls the three original partners, Surveyer (founder in 1911), Nenniger and Chenevert; and sketches his own involvement with large dams, most notably Manic 5 and Iddiki in India. He describes the difficult shift from partnership to employee-owned company during the 1960's. He analyses provincial and federal roles in the growth of consulting engineering (as president of the Association of Consulting Engineers of Canada in 1967). He tells how the engineering, procurement, and construction management roles were distributed in various cases, emphasizing the increasing importance, for time and cost efficiency, of unified control over a project. Other topics include SNC's international work, its history of industrial, especially metallurgical, process work, its defence manufacturing business,

and research and development efforts. His own proudest memories (including a video tribute on his retirement as chairman in 1986), and his relationship with colleague and successor Jean-Paul Gourdeau, are recalled. Finally, he pays tribute to Chris Ritchie, president of Monenco in the 1960's and early 1970's, whose contributions to Canadian engineering Dagenais feels have not been sufficiently recognized.

Tape #10, April 28, 1992

BERNARD LAMARRE (update) recalls the reasons, process, and consequences of the merger between SNC and Lavalin, the importance of art in the Lavalin firm, the Three Gorges project in China, and Armand Couture's move to Hydro Quebec.

Tape #11, April 28, 1992

JO-ANN PAQUET, b. Baie Comeau, Quebec; engineering degree Université Laval 1983; engineer with Alcan, Qualisys, and Lavalin; representative of the "groupe corporatif de la qualité" to SNC-Lavalin's division of energy and megaprojects (SNC-Shawinigan). Jo-ann Paquet describes her career, the structure of SNC-Lavalin, the Association québécoise de la qualité, and the need for management of quality in the working environment and in service to the clientele.